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Rediscovery of *Hemigrammus unilineatus* (Gill, 1858) (Characiformes, Characidae) in Ecuador after more than three decades

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Abstract

Hemigrammus unilineatus (Gill, 1858) (Characidae) is rediscovered in Yasuní National Park, eastern Ecuador, where it has not been reported since 1987. We present a detailed taxonomic description, including measurements and photographs, as well as a distribution map of this species in Ecuador. Based on our new evidence, we confirm the presence of *H. unilineatus* in the Ecuadorian Amazon.

Keywords

Amazon Basin, ichthyofauna, measurements, Yasuní National Park

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Introduction

Hemigrammus (Gill, 1858) is a diverse genus of small Neotropical characids with 61 valid species, which are widely distributed throughout the major cis-Andean river basins (Lima et al. 2016; Ota et al. 2019; Reia and Benine 2019). In Ecuador, this genus is represented by 14 species (Barriga 2012). *Hemigrammus unilineatus* was first described 163 years ago by Theodore Gill, based on specimens collected in the western part of Trinidad (Gill 1858). In Ecuador, *H. unilineatus* was first collected in 1981 and 1983 by Stewart et al. (1987) in a blackwater lagoon in Yasuní National Park in the northeastern Ecuadorian Amazon. Consequently, the species was included as part of the ichthyofauna of the Napo River (Stewart et al. 1987). However, years later, *H. unilineatus* was absent from lists of Ecuadorian fish (Barriga 1994, 2012; Froese and Pauly 2021). Since 1987, there have been no records of this species in the scientific literature nor in museum collections.

Recent metadata from scientific surveys and published literature suggest the presence of this species in the Ecuadorian Amazon. In this context, we document the rediscovery of *H. unilineatus* in the same region where it was first reported in Ecuador. Furthermore, we review specimens from three scientific collections as well as the species descriptions from the literature.

Methods

Specimens were collected on 7 December 2020 in a meandering tributary of the Tiputini River, within the Napo river basin, in eastern Ecuador. The collection site, which is downstream from the Tivacuno C oil rig at Yasuní National Park, had good riparian vegetation cover. Fish sampling was performed with seines of 10 × 10 mm mesh under a permit from the Ecuadorian Ministry of Environment (no. 024-2020-ARVS-OTO-MAAE). In addition to the recent sampled specimens, we reviewed specimens from two Ecuadorian scientific collections: Colección Ictiológica del Instituto Nacional de Biodiversidad, Quito, Ecuador (MECN-DP) and Museo de Zoología de la Pontificia Universidad Católica del Ecuador, Quito, Ecuador (QCAZ).

Analyzed individuals were also deposited at the Field Museum, Chicago, Illinois, USA (FMNH). Data from MECN-DP and QCAZ collections were used to plot the species' distribution (Fig. 1).

Morphometric and meristic measurements were taken with digital calipers (precision ± 0.02 mm). Measurements follow Albornoz-Garzón et al. (2019) and are expressed as percentages of standard length (SL) and head length (HL).

Information of the examined material includes the abbreviation of the ichthyological collection, voucher number, number of individuals, SL, locality, altitude, geographic coordinates, date of collection, and collectors.

Results

The rediscovery of this species prompted us to review scientific collections from Ecuador. We found misidentifications because this species can be easily confused with species of the genus *Hypessobrycon* Durbin, 1908. However, *Hemigrammus* differs from *Hyphessobrycon* by the presence of scales covering the caudal-fin, which is completely absent in *Hyphessobrycon*. *Hemigrammus unilineatus* is currently known from Tiputini, Jatuncocha, Yasuní, Cuyabeno and Aguarico river sub-basins, all tributaries of the Napo River in northeastern Ecuador (Fig. 1).

***Hemigrammus unilineatus* (Gill, 1858)**

Figure 2, Table 1

New records. ECUADOR – **Orellana Province** • An unnamed of the tributary of the Yasuní river, Yasuní river basin; 00°57′50.77″S, 075°52′23.29″W; 204 m alt.; 12.V.2005; J. Valdiviezo-Rivera leg.; 1 specimen, 31.0 mm SL, MECN-DP 323 • An unnamed of the tributary of the Tiputini, Tiputini river basin; 00°40′27.54″S, 076°22′46.00″W; 240 m alt.; 07.XII.2020; M. Buenaño leg.; 1 specimen, 26.1 mm SL, MECN-DP 4375 • Tiputini River; 00°39′39.1″S, 076°22′39.9″W; 242 m alt.;

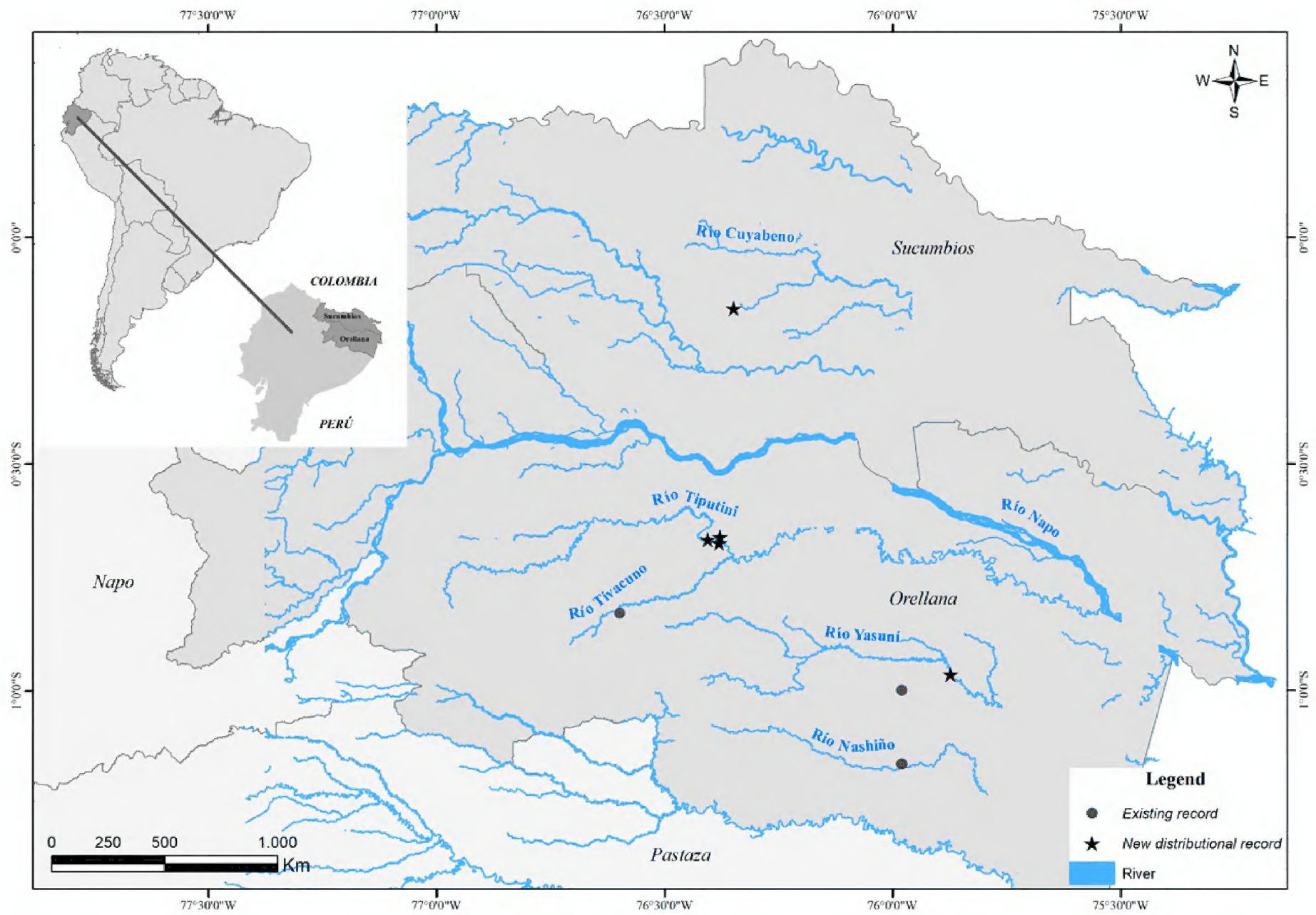

Figure 1. Records of *Hemigrammus unilineatus* in Ecuador. The dark gray area denotes the Ecuadorian provinces of Sucumbíos and Orellana (Napo river basin) in northeastern Ecuador. Black circles denote previous records of *H. unilineatus* while black stars denote new distribution records examined in the study. Blue lines denote Amazonian rivers.

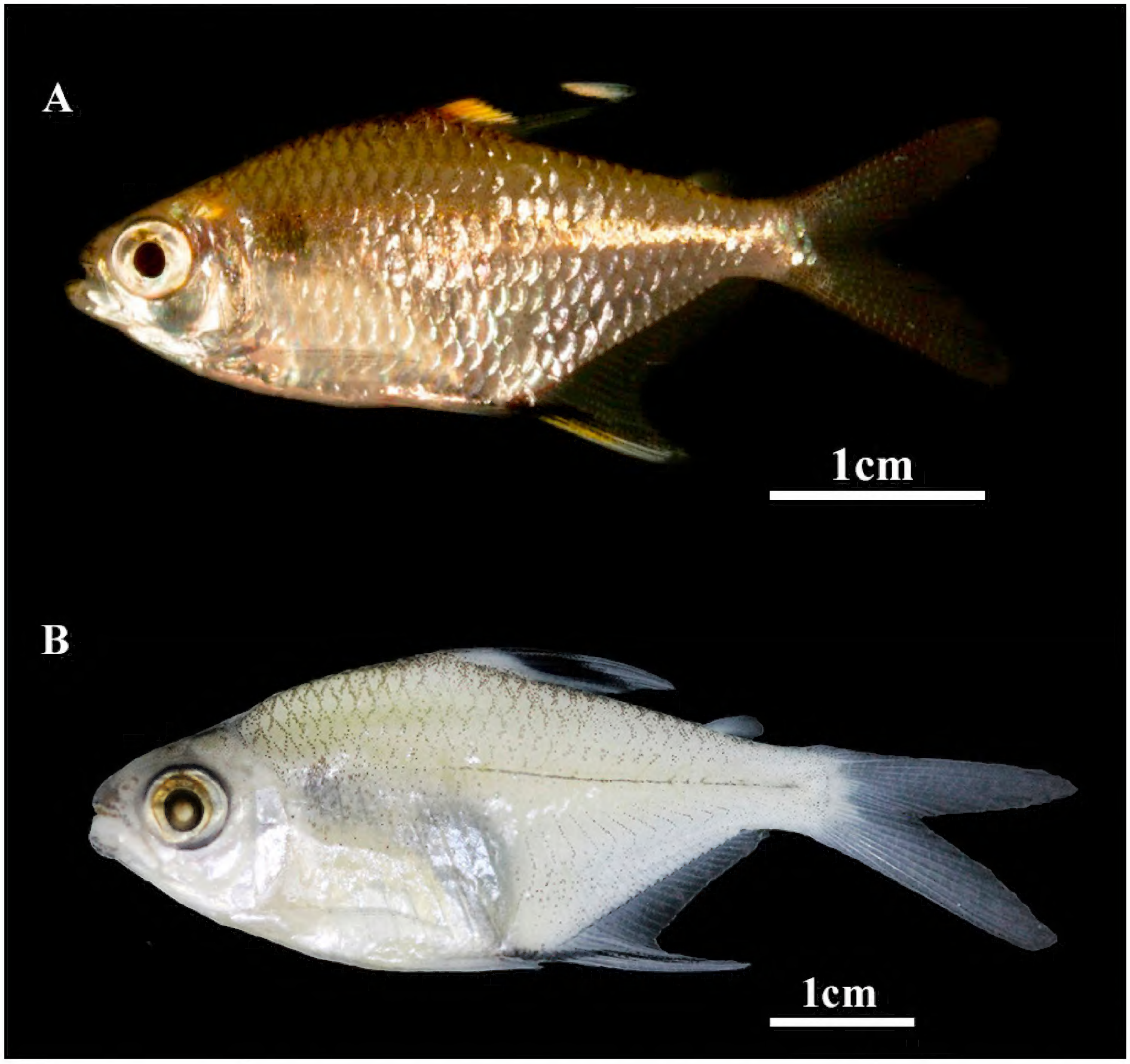

Figure 2. *Hemigrammus unilineatus* **A.** live specimen, QCAZ 2603, 32.1 mm SL. **B.** museum specimen MECN-DP 4375, 26.1 mm SL.

12.V.2012; D. Escobar-Camacho, N. Andrade leg.; 1 specimen, 32.6 mm SL, QCAZ 2604 • same locality; 1 specimen, 32.1 mm SL, QCAZ 2603; 1 specimen, 32.1 mm SL, QCAZ 2591; 1 specimen, 36.25 mm SL, QCAZ 2607; 1 specimen, 31.9 mm SL, QCAZ 2918; 1 specimen, 31.8 mm SL, QCAZ 2919 • oxbow lake next right bank of Tiputini River; 00°40′00.1″S, 076°24′17.1″W; 223 m alt.; 09.V.2012; D. Escobar-Camacho, N. Andrade leg.; 1 specimen, 35.2 mm SL, QCAZ 2854 - **Sucumbios Province** • Tarapuy River, Aguarico river basin; 00°09′25.91″S, 076°20′53.43″W; 232 m alt.; 22.XII.2008; M. Buenaño leg.; 3 specimens, 35.19–27.2 mm SL, MECN-DP 1403.

Other records (literature data). ECUADOR – **Napo Province** • Quebrada to Río Jantuncocha, Río Yasuní, Napo river basin, ca. 1 km upstream from Laguna Jatuncocha; 01°09′43.22″S, 075°58′48.95″W; 238 m alt.; 24.X.1981; D J. Stewart, M.C. Ibarra, R. Barriga, C. Uquillas leg.; 148 specimens, FMNH 102589 • Río Yasuní, Laguna Jatuncocha, Napo river basin; 01°00′0.00″S, 075°58′48.95″W; 245 m alt.; 25.X.1981; D.J. Stewart, M.C. Ibarra, R. Barriga, C. Uquillas leg.; 26 specimens, FMNH 102590 • Río Yasuní, Quebrada to Río Jatuncocha, ca. 2 km upstream from Laguna Jatuncocha, Napo river basin; 01°09′43.22″S, 075°58′48.95″W; 224 m alt.; 26.X.1981; D.J. Stewart, M.C. Ibarra, R. Barriga, C. Uquillas leg.; 11 specimens, FMNH 102591 • An unnamed of the tributary of Río Cuyabeno, north bank about 3 km upstream from Laguna Grande de Cuyabeno, Napo river basin; 01°09′43.22″S, 075°58′48.95″W; 223 m alt.; 29.IX.1983; D.J. Stewart, M.C. Ibarra, R. Barriga, E. Azanza leg.; 1 specimen, FMNH 102592 • same locality; 29.IX.1983; 1 specimen, FMNH 102593 • Río Agua Negra, at bridge, km 4.5 on road to Río San Miguel (Río Cuyabeno–Río Aguarico drainage), Napo river basin; D.J. Stewart, M.C. Ibarra, R. Barriga leg.; 27 specimens, FMNH 102594 • Río Cuyabeno, Río Chespirito, at bridge on road to Río San Miguel, Napo river basin; 02.X.1983; D.J. Stewart, M.C. Ibarra, R. Barriga

Table 1. Measurements of *Hemigrammus unilineatus* (*N* = 12) from Ecuador.

Characters	*N*	Min	Max	Mean	±SD
Standard length (mm)	12	27.9	473.6	388.0	138.8
Percentage of standard length					
Depth at dorsal-fin origin	12	38.7	47.4	42.6	2.8
Snout to dorsal-fin origin	12	47.0	56.6	52.3	2.5
Snout to pectoral-fin origin	12	25.9	29.7	27.7	1.2
Snout to pelvic-fin origin	12	42.1	48.7	45.4	2.3
Snout to anal-fin origin	12	59.7	66.8	63.5	2.5
Caudal peduncle depth	12	9.3	11.4	10.4	0.7
Caudal peduncle length	12	7.7	11.8	9.8	1.2
Pectoral-fin length	12	19.1	28.1	23.3	2.8
Pelvic-fin length	12	16.2	22.4	18.9	1.7
Dorsal-fin length	12	27.3	36.1	30.9	3.1
Dorsal-fin base length	12	12.0	16.9	14.1	1.3
Anal-fin base	12	31.4	36.9	33.5	1.7
Anal-fin length	12	18.3	33.3	24.7	4.5
PosteRíor margin of eye to dorsal-fin origin	12	28.2	37.0	33.1	2.8
Head length	12	25.1	31.9	27.9	2.2
Percentages of head length					
Head depth	12	92.3	118.2	103.8	9.3
Snout length	12	15.4	28.9	21.8	3.3
Least interorbital width	12	33.3	40.5	35.2	2.0
Upper jaw length	12	27.4	44.9	34.9	5.3
Eye diameter	12	33.4	45.7	40.8	4.1

leg.; 1 specimen, FMNH 102595 • Laguna Zancudococha, varíous habitats, Río Aguarico drainage, Napo river basin; 00°49′46.22″S, 076°35′51.86″W; 250 m alt.; 28.X.1983; D.J. Stewart, M.C. Ibarra, R. Barriga leg.; 3 specimens, FMNH 102596 • An unnamed of the tributary of the Río Cuyabeno, just upstream from bridge, 11 km N of Marian (17 km north of "Y"), Napo river basin; 29.XI.1983; D.J. Stewart, M.C. Ibarra, R. Barriga leg.; 12 specimens, FMNH 102597 • Cuyabeno, Aguarico, Napo, Amazon, Río Aguas Negras, ca. 1–2 km upstream from road bridge (bridge is about 2 km S of Marian), Napo river basin; 01.XII.1983; D.J. Stewart, M.C. Ibarra, R. Barriga leg.; 1 specimen, FMNH 102598 • Cuyabeno, Aguarico, Napo, Amazon, tributary of Río Tarapuy (N bank tributary just downstream from road bridge), Napo river basin; 02.XII.1983; D. J. Stewart et al. leg.; 712 specimens, FMNH 102599.

Identification. *Hemigrammus unilineatus* can be recognized by the following characteristics: five tricuspid teeth in the inner premaxilla; scales covering basal caudal fin base; lateral line incomplete; humeral spots two, the first conspicuous and vertically elongated and the second dorsally pronounced; anal fin with an oblique black band; anal fin with 23–29 rays. Morphometric measurements of *H. unilineatus* are shown in Table 1.

Discussion

The first studies of Ecuadorian freshwater fish were made in the 19th century (Günther 1864; Boulenger, 1887), and eventually the first annotated list of Ecuadorian freshwater fish species was published by Ovchynnyk (1968), who reported 295 species, which he later increased to 306 (Ovchynnyk 1968, 1971).

Since then, important efforts have added additional species to the inventories of freshwater fishes of Ecuador. Early lists of freshwater fishes of Ecuador, such as Stewart (1987) and Barriga (1991) reported 706 species. These early lists mentioned the presence of *Hemigrammus unilineatus* in Ecuador. However, in later lists of species (Barriga 1994, 2012) of the Ecuadorian ichthyofauna, *H. unilineatus* was not included. The most recent mention of *H. unilineatus* in Ecuador was in a study analyzing the influence of season and habitat on fish communities in Yasuní National Park (Galacatos et al. 2004).

According to Froese and Pauly (2021) and Fricke et al. (2021), *H. unilineatus* is distributed in the rivers of Trinidad, Venezuela, Guyana, Suriname, and French Guiana. Furthermore, the species is supposed to inhabit the Guaporé and Amazon basins (Brazil, Colombia, Bolivia, Ecuador, French Guiana, Guyana, Peru, Suriname, Trinidad and Tobago, and Venezuela) (Froese and Pauly 2021; Fricke et al. 2021). However, no study since 1991 has explicitly reported the presence of this species in Ecuador, suggesting the species is rare during sampling surveys. This may be attributed to the following reasons: wild populations are naturally low; the species exhibits a specific distribution pattern that makes it rare to catch; or it exhibits a habitat specificity that is ignored and its rarity is product of sampling methods and efforts, which may underestimate species richness (Gaston and Lawton 1990; Ceballos 2001; Yanez-Muñoz et al. 2010).

There are still knowledge gaps in the evolution and ecology of *H. unilineatus*. Based on our new data, we confirm the presence of *H. unilineatus* in Ecuador, exclusively in Yasuní National Park in eastern Ecuador.

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Authors' Contributions

Conceptualization: JVR. Funding acquisition: JVR, MBC. Investigation: JVR, MBC, DEC. Project administration: JVR. Supervision: JVR, DEC. Writing – original draft: JVR, MBC, DEC. Writing – review and editing: JVR, MBC, DEC. Visualization: JVR, DEC.

References

Albornoz-Garzón JG, Méndez-López A, DoNascimiento C, Lima FCT (2019) A new species of *Hemigrammus* (Characiformes: Characidae) from western Amazon river basin, Colombia. Journal of Fish Biology 95: 932–939. https://doi.org/10.1111/jfb.14091

Barriga R (1991) Peces de agua dulce. Revista Politécnica 16 (3): 7–88.

Barriga R (1994) Peces del Parque Nacional Yasuní. Revista Politécnica 19 (2): 9–41.

Barriga R (2012) Lista de Peces de agua dulce e intermareales del Ecuador. Revista Politécnica 30 (3): 83–119.

Boulenger CA (1887) An account of the fishes collected by Mr. C. Buckley in eastern Ecuador Proceedings of the Zoological Society of London 1887: 274–283.

Ceballos C (2001) Especies raras, el conocimiento de la diversidad biológica y la conservación. CONABIO. Biodiversitas 38: 9–13.

Fricke R, Eschmeyer WN, Van der Laan R (Eds.) 2021 Eschmeyer's catalog of fishes: genera, species, references. http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp. Accessed on: 2021-08-19.

Froese R, Pauly D (Eds.) 2021 FishBase. https://www.fishbase.de/search.php. Accessed on: 2021-08-19.

Galacatos K, Barriga R, Stewart DJ (2004) Seasonal and habitat influences on fish communities within the lower Yasuní River basin of the Ecuadorian Amazon. Environmental Biology of Fishes 71 (1): 33–51.

Gaston KJ, Lawton JH (1990) The population ecology of rare species. Journal of Fish Biology 37 (Supplement A): 97–104. https://doi.org/10.1111/j.1095-8649.1990.tb05025.x

Gill TN (1858) Synopsis of the fresh water fishes of the western portion of the island of Trinidad, W. I. Annals of the Lyceum of Natural History of New York 6: 363–430.

Günther A (1864). Catalogue of the fishes in the British Museum, vol. 5. Catalogue of the Physostomi, containing the families Siluridae, Characinidae, Haplochitonidae, Sternoptychidae, Scopelidae, Stomiatidae in the collection of the British Museum. Trustees of the British Museum, London, 455 pp.

Jiménez Prado P, Aguirre W, Laaz E, Navarrete R, Nugra F, Rebolledo E, Zárate E, Torres A y Valdiviezo-Rivera J (2015) Guía de peces para aguas continentales en la vertiente occidental del Ecuador. Pontificia Universidad Católica del Ecuador Sede Esmeraldas (PUCESE), Universidad del Azuay (UDA) y Museo Ecuatoriano de Ciencias Naturales (MECN) del Instituto Nacional de Biodiversidad, Esmeraldas, Ecuador, 416 pp.

Lima FCT, Correa V, Ota RP (2016) A new species of *Hemigrammus* Gill, 1858 (Characiformes: Characidae) from the western Amazon basin in Peru and Colombia. Aqua, International Journal of Ichthyology 22 (3): 123–132.

Ota RP, Lima FCT, Hidalgo M (2019) Description of a new *Hemigrammus* Gill (Characiformes: Characidae) from the río Madeira basin in Peru and Bolivia. Zootaxa 4577 (2): 335–347. https://doi.org/10.11646/zootaxa.4577.2.6

Ovchynnyk MM (1968) Annotated list of the freshwater fish of Ecuador. Zoologischer Anzeiger 181 (3/4): 237–268.

Ovchynnyk MM (1971) Unrecorded and new species of fishes from fresh waters of Ecuador. Zoologischer Anzeiger 187 (1/2): 82–122.

Reia L, Benine RC (2019) A new species of *Hemigrammus* Gill 1858 (Characiformes: Characidae) from the upper Río Negro, Amazon basin, Brazil. Zootaxa 4555 (3): 407–415. https://doi.org/10.11646/zootaxa.4555.3.9

Stewart D, Barriga R, Ibarra M (1987) Ictiofauna de la cuenca del río Napo, Ecuador oriental: lista anotada de especies. Revista Politécnica 12 (4): 9–63.

Yanez-Muñoz M, Urguiles M, Altamirano M, Cáceres S (2010). Redescripción de *Anolis proboscis* Peters & Orcés (Reptilia: Polychrotidae), con el descubrimiento de las hembras de la especie y comentaRíos sobre su distribución y taxonomía. ACI Avances en Ciencias e Ingenierías 2 (3): 7–15. https://doi.org/10.18272/aci.v2i3.39